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Pruning Shrubs.

EVERY year, and often in the course of the year, as a rule, we have inquiries as to the proper method of pruning shrubs, and we have explained more than once the best practice as fully as was possible in a brief compass. Nevertheless, continually recurring inquiry deserves repeated answers, and, although we have nothing new to say, it may not be amiss to discuss the subject briefly once more. It is a hopeful sign for American gardens that the use of deciduous shrubs has increased so largely within a few years. Our climate is peculiarly favorable to the growth of flowering shrubs, and when we learn to give them deep rich soil and cultivate them as they deserve their value will be more generally appreciated. As far as pruning is concerned, the most cruel way to treat them is to turn an untrained laborer loose among them and direct him to "trim them into shape." Sometimes the man-of-all-work will shear every one off at an even height, like the top of a hedge, or he will aim to get every one into the form of a cone or hemisphere, his idea of beauty being that every shrub should be shaped exactly like its neighbor. Of course, each plant to be at its best should develop its special graces in the line of its natural growth, and this primary law is defeated in shrubbery where every individual is cut to one pattern. This formal shearing not only destroys the shrub's beauty of outline, but it lessens the power of the plant to produce flowers and fruit and weakens its constitution.

There are two or three elementary rules which are to be observed when the production of flowers is primarily desired. Shrubs which blossom early in the spring form their flower-buds the year before and ingeniously protect them during the winter with a warm covering, so that they are ready to open with the early days of spring sunshine. Any one who will cut off the twig of a Peach-tree in the winter or of an early-flowering Spiræa and put it in water will understand this, for the flowers will expand in a few days after it has been brought into a warm room. Obviously, if the branches of such shrubs are cut hard back in autumn, all the flower-buds are cut away and there is no bloom in the spring. If, however the branches are cut back immediately after the flowering season is over, this will encourage the growth of new shoots from buds near the base of the branch and these will grow rapidly to take the place of the part that has been lost and cover themselves with flower-buds for another year. Another class of shrubs, like the Hydrangeas, Althæas and certain Tamarisks, which flower in late summer or autumn from buds which have developed on the wood grown during the current summer, should be pruned in late autumn after flowering or, at least, before the wood starts in the spring, so as to encourage abundant summer growth and flower-buds for the next autumn. But these are the simplest elementary rules and relate solely to the production of flowers. Shrubs are useful for many other purposes than merely to display their blossoms. They are beautiful all the year round. Even in the winter the variously colored barks of many of them add a singular charm to the landscape. We, therefore, prune them, not only to promote the production of flowers, but of wood and foliage and fruit as well, to insure grace or symmetry of outline, and to make them vigorous and healthy.

The simple cutting in of flowering wood in spring or fall is thus a small part of the art of pruning, and where there is a large variety of shrubs there is no time of year when something in this direction cannot be done, and it is especially useful when it is continued throughout the entire growing season. If surplus wood is to be removed, a clean cut in midsummer will heal over much more readily than it will in cold weather, and there is no better time for removing superfluous branches or for shortening in over-vigorous shoots which interfere with the symmetry of a specimen. Some trees and shrubs whose branches bleed when cut in spring will heal over quickly if pruned while in full leaf. If the strong branches are pinched back in summer the wood will ripen into such a sound condition for withstanding cold that trees naturally tender have been known to endure our winters fairly well when their branches had been properly stopped. This summer pinching is especially useful in wet seasons, when otherwise the wood keeps growing late in autumn and is caught by freezing weather in a soft and sappy condition. It also discourages upward growth where this is undesirable, and tends to develop fruit-buds, so that shrubs and trees will bear fruit at an earlier age when they are properly pinched back. For the same reason shrubs will ripen their fruit more perfectly when the stronger shoots above it have been stopped.

Just how much to cut is a matter to be learned by experience. Sometimes the best way to renovate a shrubbery is to cut many of the plants to the ground and let them start anew. In others a very severe pruning is often advisable. If every annual shoot of the large-panicled Hydrangea is cut back in autumn or early spring to a couple of eyes the growth next year will be very vigorous, and even after the new shoots start, if all the weaker ones are rubbed out, enough will remain, each one carrying an immense flower head at its extremity, to completely cover the shrub with bloom. But it should not be forgotten that too much pruning weakens plants. When florists began to sell long-stemmed Roses they soon discovered that they were selling the vitality of the plant as well as the flowers, and they learned to give a long period of rest to the weakened plants which were to produce another crop, so that they might recuperate their exhausted energies. Every one has observed how abundantly the foliage starts out from the stump of an amputated branch of a Silver Maple, for example, but this is not a proof of increased vigor. In reality it is a signal of distress, and shows that the tree has aroused itself to an extra effort to supply the places of the organs of nutrition of which it had been robbed. A young plant carefully pruned when it is set out in good ground, with room enough to grow in, will sometimes need, as it grows, to have interior branches cut away for the admission of light and air, and the over-strong shoots pinched backed in midsummer and dead wood carefully removed.

Little more will be required, as a rule, except to shorten in judiciously the flowering wood after bloom, and under this treatment shrubs will develop into their best form and flower abundantly year after year.

An instructive paragraph in the forthcoming report of Secretary Morton refers to the gratuitous seed-distribution by the Government, which he had attempted to regulate and place on a rational basis in accordance with the purpose of the law as it was originally enacted. Unfortunately, his good intentions were thwarted by Congress, and he reports that for the year ending in June he has contracted for seed to the value of $130,000. Prices were low last year, but they are still lower this year, so that the quota of each Congressman will be double what it was in the year 1896, and will contain enough seed to plant about three hundred acres instead of 163½ acres, as was the case last year. Careful estimates show that at retail-price valuation these seeds would amount to more than two million dollars, and it is no wonder that the retail seedsmen of the country made an effort by injunction to prevent the Department from purchasing seed to be used in competition with their business. This injunction, however, was denied, and thus, as the Secretary remarks, the great privilege of gratuitously furnishing garden and flower seeds to a small per cent. of the people out of the money raised from the revenue of all the people is preserved by the members of Congress and the officers of the Department of Agriculture. Of course, there is no more reason why Congress should scatter seed around in this loose way than there is for distributing flannel shirts or liver pills or stove polish. But, nevertheless, the seed distributed this year will be sufficient to plant 230 square miles of ground, and will, therefore, employ in its distribution sixty mail cars. Last year the seed would have planted a strip of ground a rod wide and more than 36,000 miles in length. This year the increased appropriation would plant a strip of this width which would reach three times round the globe, and the cost of carrying this four hundred and odd tons of seed through the mails will be something like $150,000. We unite with the Secretary in regretting sincerely this unnecessary and wasteful expenditure of public money. It is a national disgrace that Congress does not put a stop to the wretched business.

The Study of Varieties of Fruits and Vegetables.

In connection with the criticism upon Variety Tests at the Experiment Stations, which appeared in a recent editorial in Garden and Forest, I should like to call attention to two ways in which a garden collection of the varieties of a cultivated species may be used with profit.

First, in tracing the progress that has been made in improving the species during a given period, such a collection is indispensable. The importance of knowing just how a species is inclined to vary, and what value has been placed on certain variations that have occurred, is apparent when questions relating to the further improvement of the species are considered. This is especially true when these values have been passed upon by a jury of thousands of competent gardeners and their customers. As the birth-rate of new varieties in the trade greatly exceeds the death-rate of the old, it is possible to bring together in a garden collection about all of the varieties of a particular fruit or vegetable that have enjoyed any degree of popularity during a period of fifty years or more. And in the absence of both exact descriptive literature and museum specimens we must go to such a collection in order to compare what are considered the most highly developed forms of a species at the present time with those that were considered the best, five, ten, twenty or fifty years ago.

Second, in sifting out the less important singularities of the different sorts from what may be termed the specific traits of the cultivated form of the plant, the garden collection of varieties can furnish information that is not obtainable elsewhere. In making generalizations concerning such matters, as the disorders to which plants of a species are subject, or the atmospheric or soil conditions that are either favorable or antagonistic to the performance of the vital functions of the plants, it is important that one should not be misled by varietal eccentricities. The popularity of varieties is often of short duration, and it is in no wise certain that the successor to the variety of any fruit or vegetable that is looked upon most favorably at the present time will be an offspring of that variety, or even of the parents of that variety. It may come from quite a different branch of the species. Consequently, a comprehensive study should include the distinct forms, and so far as all of the varieties have traits in common, these may be considered in generalizations relating to the species as a whole. Varietal peculiarities which are of a less permanent character should not materially influence such generalizations, but be associated with the variety or varieties to which they belong.

Rhode Island Experiment Station. *L. F. Kinney.*

A Cañon near Ukiah.—I.

Ukiah valley is the bed of one of an ancient chain of lakes which formerly extended along the upper course of Russian River, in the heart of the Coast Range of northern California. By a process of silting on the one hand and cutting down their outlets on the other, these lakes had, at the time of the first white settlements some forty years ago, been reduced to mere ponds, which were soon drained. In the table-lands about the foot of the steep surrounding mountains the banks of the old lakes may be seen, while their beds are rich alluvial lands. Ukiah valley is eight miles long, with an extreme width of three miles. On the east and west it is hemmed in by high ranges which rise to twenty-three hundred feet above the sea and seventeen hundred above the floor of the valley. The range to the west is abrupt in ascent and deeply cut by great cañons, or gorges as they would be called east of the Rockies, down which in winter torrential streams flow, while in summer there are living streams fed by springs. Here, as well as elsewhere in California, almost all of the precipitation of rain is between October and April. During that period from thirty to fifty inches fall, while between May and October scarcely enough falls at any time to lay the dust. Each of the cañons of this section has its distinctive features, dependent on soils, slope, exposure, moisture, and the angle at which the sun strikes it. In the Sierras large areas have substantially the same soil and support about the same class of vegetation. In this part of the Coast Range the soils change at short intervals sufficiently to affect vegetable life. The mountain regions have been so torn by upheavals, landslides and the action of heavy rainfall, that the soil is hardly the same in any two consecutive spans of a hundred yards each.

The mountain west of Ukiah marks the most distant point from the ocean reached by tne Redwood forest. A few of these trees are found on the edge of the valley, others are scattered along the mountain streams, and on cool slopes there are a few small groves, but on the east side of the valley not one is to be seen. For fifty miles north and south the same condition exists. Even where the Russian River is narrowed to a gorge, and Redwoods dip their branches in its water on the west side, not a single tree has crossed the stream. All of the trees which are its attendants, except the Tanbark Oak, Quercus densiflora, are found in abundance on the east side of the river and chain of valleys.

One of the most beautiful and varied of the cañons on the west side debouches into the valley about a mile below Ukiah, and is locally known as Doolan Cañon. For a half mile before it enters the valley its floor is a vale a few hundred yards wide. Starting from the stream the slope is at first gentle, but quickly changes to abrupt hillsides, which rise to high headlands on either side. A beautiful

mountain stream has formed tiny alluvial flats, in which California Laurels and Alders luxuriate and have grown to great size. Here and there are groves of Redwood, the trees fifty to seventy feet high, straight and beautiful. They seem at first to be seedlings, but examination shows the stumps of big trees which were cut in the "fifties," and around each is a grove of sprouts. I know of no finer place to find the rate of this second growth, and hope to give measurements from these groves later on. In places the Wild Grape has overgrown Alder, Redwood and Laurel so completely that scarcely a leaf of the host can be seen. At all times when in foliage these masses of vines are striking, but in the fall the color of the leaves is gorgeous and there is nothing in our woods to equal their brilliancy.

The headland on the south side of the cañon is densely clothed with trees. On the cool slopes the Black Oak, Quercus Californica, predominates, but Douglas Spruce and Madroña are abundant and their evergreen habit prevents the woods from ever seeming bare. The timbered land extends less than half a mile up the slopes to the south and then gives way to a dense and practically impassable mass of trees from fifteen to thirty feet high, mingled with tall shrubs, all in the greatest variety. The Mexican name for this dense growth is Chapparal, and by that name it is known throughout the state. It covers millions of acres of the high slopes on the north sides of the mountains of the Coast Range. The mountain sloping to the north of the cañon, and facing south, is grassy, with scattering trees, mostly Post Oak, Q. Douglasii, a deciduous Oak with small lobate leaves and white bark. It thrives in hot places and dry lands, and usually forms a small tree, although occasionally three feet through. At less than half a mile from the stream the grass and trees give way to the Chemisal or Chemise Brush. Imagine slope after slope, hill after hill and mile after mile of low dense brush of a uniform blue green, which from the valley seems as smooth in outline and as close-cropped as a lawn, and gives to every mountain the same rounded outline, and you have Chemise Brush, Adenostoma fascicularis. This in winter. Imagine the same soft monotony of color and outline, with only a little more tawny a shade given by its dried-up flowers, and you have the appearance in summer and fall. Close at hand, Chemise is fully as dense, but not nearly as smooth, as it looks from a distance. Covering nearly all of the higher mountain of the east half of the Coast Range it is a world of itself and deserves separate treatment.

An old sled road, made by the pioneers who cut the Redwoods so long ago, leads up the cañon. In some places it is overgrown, in others washed away, but a good walker can follow it, and if he loves nature he will be well repaid in any season, for between the high slopes of Chemise on the one side, and of Chapparal on the other, is enclosed a floral treasure-house, richer from the impassable surroundings. I have loved and traversed this cañon for years, yet on my last trip I found a beautiful spot of whose existence I had never dreamed.

In the early spring the first flowers show in the warm Oak woods. The very earliest is Cardamine pausisecta, with beautiful leaves purple beneath, and fragrant white flowers. It is soon followed by our Cowslip. The form here is Dodecatheon Hendersonii, which, to my eye, is prettier than the much praised D. Clevelandii of the south. It is especially abundant at the edge of the Chemise Brush and in any little open place in it, and forms large beds. The plants which the children call Chocolate Lily, and which botanists know as Fritillaria lanceolata, grow freely in the Oaks and flower in late March. Its graceful habit atones to some extent for its dull flowers. It has been remarked that it should be grown with the waxy white bulb in the air, for this is covered thickly with pearl-like grains and is really beautiful. Soon, Buttercups, Ranunculus macranthus, the Nemophilas and a multitude of other plants follow in the midspring bloom. Up this little gully shaded by Live Oaks and Spruce, on a rocky ledge among the Fern and Poison Oak, are thousands of Dog-tooth Violets, Erythronium giganteum. The recurving petals measure two to two and a half inches across, creamy yellow in color, with an orange centre, and occasionally banded with maroon. The leaf-mold which has gathered in the rocky débris quite meets the needs of the plants.

In their seasons two Irises beautify the cañon. In the gritty soil of the Oak woods along the warmer part of the cañon and among the Manzanitas of the warm south slopes I. macrosiphon grows in abundance, and it seems to thrive in the hottest and driest places. It forms large clumps of hundreds of plants, the wiry rhizomes spreading until, in some cases, the dense clumps measure three feet across. It flowers in May and June, bearing many small but handsome flowers in shades of blue, lilac and purple. I. Douglasiana is quite different. Its home is where the little vale ends by the steep cañon-sides. There in the deep and rich débris which has accumulated at the foot of the slopes it is at its best. Its leaves are long and glossy, the mats not crowded, and frequently few-stalked. The base of the leaves is rosy. Its exquisite flowers are large and few, borne well up, the ground-color creamy or ochre, with purple veining, the texture heavy and exquisitely frosted. I have seen no Iris to equal them in beauty. They grow even better in my Fern-bed than in the woods.

Ukiah, Calif. *Carl Purdy.*

Foreign Correspondence.

Edinburgh Botanic Garden.

A BOTANIC GARDEN was founded in Edinburgh in 1670 by Doctor (afterward Sir Andrew) Balfour. Mr. James Sutherland was the first Curator and Professor of Botany, and, according to a catalogue prepared by him in 1683, there were some three thousand species of plants cultivated there. This garden has long since disappeared, the site being now occupied by the North British Railway. A second garden was established in Leith Walk in 1763, but this grew to be unsuitable, and in 1819 the present site in Inverleith Row was purchased. At that time the gardens were about fourteen acres in extent. By 1870 the area had doubled, and at the present time the garden occupies about fifty-five acres of uneven ground about two miles from the centre of the town. In 1889 the Edinburgh Garden was included in the Royal Parks and Gardens, under the management of the Commissioners of Her Majesty's Works and Public Buildings, and was thus placed on all fours with Kew as a national establishment, supported by public funds. It has an annual grant of about £4,500, and has a Director, styled Regius Keeper, curators, etc. It differs from Kew in being an adjunct of the University of Edinburgh, and large class-rooms, laboratories, museums, etc., are devoted to the teaching of botany to from two to three hundred students. It also possesses a large herbarium and a well-stocked library.

Professor I. Bayley Balfour, the present Director, has done much to improve the gardens both in a popular and a scientific sense. The grounds have been remodeled and the collections of trees, shrubs and herbaceous plants strengthened and rearranged. The old glass houses have nearly all been replaced by new and admirably planned structures of the most approved pattern, and the museum collections overhauled and set in order.

An excellent library and reading-room has been provided for the use of the garden staff. The active, energetic spirit and enthusiasm of the Director pervades the whole establishment, and any one who knew the Edinburgh Botanic Garden ten years ago cannot fail to notice the great improvement that has been made since that time. The Government authorities have been liberal in granting funds for the required alterations, some £10,000 having been spent in new works, and about another £5,000 will be needed before all that is contemplated is accomplished.

The alpine collection and rock garden at Edinburgh have

always been famous for extent and excellence of cultivation. This is partly due to the favorable character of the climate. The rockery is not picturesque, but it provides accommodation for an enormous collection of all kinds of choice plants, and therefore serves the main purpose of such a structure. It occupies a slope upon which mounds have been thrown up and the stones arranged somewhat formally, so as to provide about four thousand pockets. Such genera as Primula, Veronica, Silene, Gentiana, Sempervivum and Saxifraga are very largely represented. Dwarf trees and shrubs are planted here and there among the stones. The herbaceous plants are arranged similarly to those at Kew, namely, in long narrow beds running parallel to each other on a lawn in an open part of the garden.

Among the trees Coniferæ are the most noteworthy, while the collection of Ericaceæ is exceptionally rich. A small pond for aquatics is as remarkable for the large collection of plants it contains as for its inartistic shape. The new plant-houses are excellent in design and they are stocked with collections of well-grown plants of all kinds, from succulents to economic plants, from Orchids to Ferns; long corridors filled with climbers, and from one side of these start houses at right angles, the sheds, etc., being on the other side. The old Palm-house has been greatly improved by pulling out the sides, and all round it is a sloping annex. This has resulted in a house exceptionally well adapted for the cultivation of all kinds of tropical plants, and although it is only about two years since the alteration was made the contents of the house are generally splendid examples of good cultivation. With the exception of a shelf extending all round the side of the annex for the accommodation of pot-plants, the whole of the space is occupied by beds of soil in which the plants are planted. Numerous successes have already been achieved in this house in the flowering of rare plants and the robust growth of recalcitrant ones. The roof is furnished with a large collection of climbers, all luxuriating as a gardener loves to see them. Combretum purpureum, Odontadenia speciosa, Camoensia maxima, Momordica mixta, Corynostylis hybanthus, Ipomœa Horsfalliæ and Aristolochia gigas are specially noteworthy. Cycads of all kinds appear to delight in being planted out, while such plants as Randia maculata, Rudgea macrophylla, Napoleona cuspidata, Coccoloba pubescens and Acacia sphœrocepha have grown with a luxuriance never seen before. In one of the large greenhouses Restio subverticillatus is represented by a magnificent specimen ten feet in diameter, the horse-tail-like stems being seven feet long. Gleichenias, in the same house, are equally remarkable for size and vigor.

Orchids, of which the collection comprises about nine hundred species and varieties, are generally in good condition. The collection of Masdevallias formed by the Marquis of Lothian, while preparing his monograph of the genus, has now become the property of the Edinburgh Botanic Garden. Begonia President Carnot planted out, the stems trained against the roof-glass in a warm house, has grown to a large size and in October bore pendent heads of rich rose-red flowers nearly a foot in diameter, the leaves being about a foot long. Nepenthes, Droseras, Darlingtonias, Sarracenias and other insectivorous plants are a special feature in this garden. Disa grandiflora also grows as freely as on Table Mountain, and Ouvirandra fenestralis, grown in a tub in a shaded position, was crowded with big leaves and was in flower. A second large house, originally built for Palms, is now used as a temperate house and contains large specimens of Australian trees, Palms, Ferns and Coniferæ. Chamærops Griffithiana, thirty feet high; Livistonia Sinensis, fifty feet; Dacrydium cupressoides, forty feet; Rhopala corcovadense, twenty feet, and a unique specimen of a Podocarpus ferrugineus, with long drooping whip-like branches, are among the noteworthy plants in this house. It is intended to attach a sloping annex to this as to the tropical Palm-house.

A house filled with succulents, all the large specimens of which are planted out in a bed of light soil, is an important feature. Large plants of Cereus giganteus, Echinocactus Wislizeni, Opuntia imbricata and others imported from Arizona are growing most vigorously under the liberal treatment afforded by the planting-out system.

The planting out of all the larger plants in preference to growing them in pots is a new departure in botanic-garden culture, and it is being watched with interest by all who are concerned with the cultivation of plants under glass. So far it has proved an unqualified success. The only possible objection to it is that it rushes the plants, as it were, into a luxuriance which is not easily controlled, so that they soon become too large for their positions. On the other hand, the plants are seen at their best when treated in this manner, and I would rather enjoy a healthy specimen for two years than put up with a miserable half-starved scrag of a plant for twenty. If a succession of young plants is kept up, so that overgrown specimens may be rooted out and replaced, the results of this planting-out treatment must, on the whole, be far preferable to pot-culture. There is a great deal too much stage and flower-pot in indoor gardening as practiced nowadays.

London. *W. Watson.*

New or Little-known Plants.

Aspidium simulatum, Davenport.*

THIS is another New England Fern, new to botanical science, for which we are indebted to the acute observations of Raynal Dodge, who first brought it to the notice of Professor Eaton and myself. That it should have escaped attention so long as it did is undoubtedly due to the fact that no one supposed it possible to find a new Fern within the limits of an area so thoroughly worked over as that of Gray's *Manual* was supposed to be, and if in any instance it did attract attention it was in all probability looked upon merely as a form of Aspidium Thelypteris or Noveboracense, with which it nearly always grows. Once recognized, however, it is quickly seen to be entitled to specific recognition, and one wonders that it did not sooner arrest the attention of some of the older botanists who were generally keenly alert for new forms and quick to recognize them.

The frequency with which this Fern has been collected since its publication, only two years ago, shows that it is by no means uncommon, and that it is likely to be found abundantly over a wide area of distribution, and also shows that it will not always do to take it for granted that the resources of any given area are exhausted, however carefully it may have been worked over.

Unlike Aspidium Thelypteris, which prefers the partially open to deep shade, this plant loves the shade and moisture of cool hummocks in deep woods and swamps, thriving vigorously fertile where A. Thelypteris is invariably flaccid and sterile.

The finest clumps of Aspidium simulatum that I have anywhere seen were growing on large hummocks in a submerged swampy woodland on Indian Point, Maine, with the tall, fertile fronds overtopping the sterile half their own length, and from three to three and a half or more feet high. They had the hummocks all to themselves, and it was a most beautiful sight to see hundreds of these tall, gracefully waving fronds rising to the height of the Osmundas near by, and far surpassing them in that gracefulness of form and presence which lends so great a charm to many other of our native Ferns.

Aspidium simulatum is seldom found growing in the open, except where the woodlands have been cut off, leaving its natural habitat exposed to the direct rays of the sun, when it takes on a more contracted form with conduplicate pinnæ, and exactly simulates the narrow form of Asplenium Filix-fœmina, which suggested its name. Plants of these two forms growing side by side in my garden so closely resemble each other in every way that, although

* *Botanical Gazette*, vol. xix., p. 495, December, 1894.

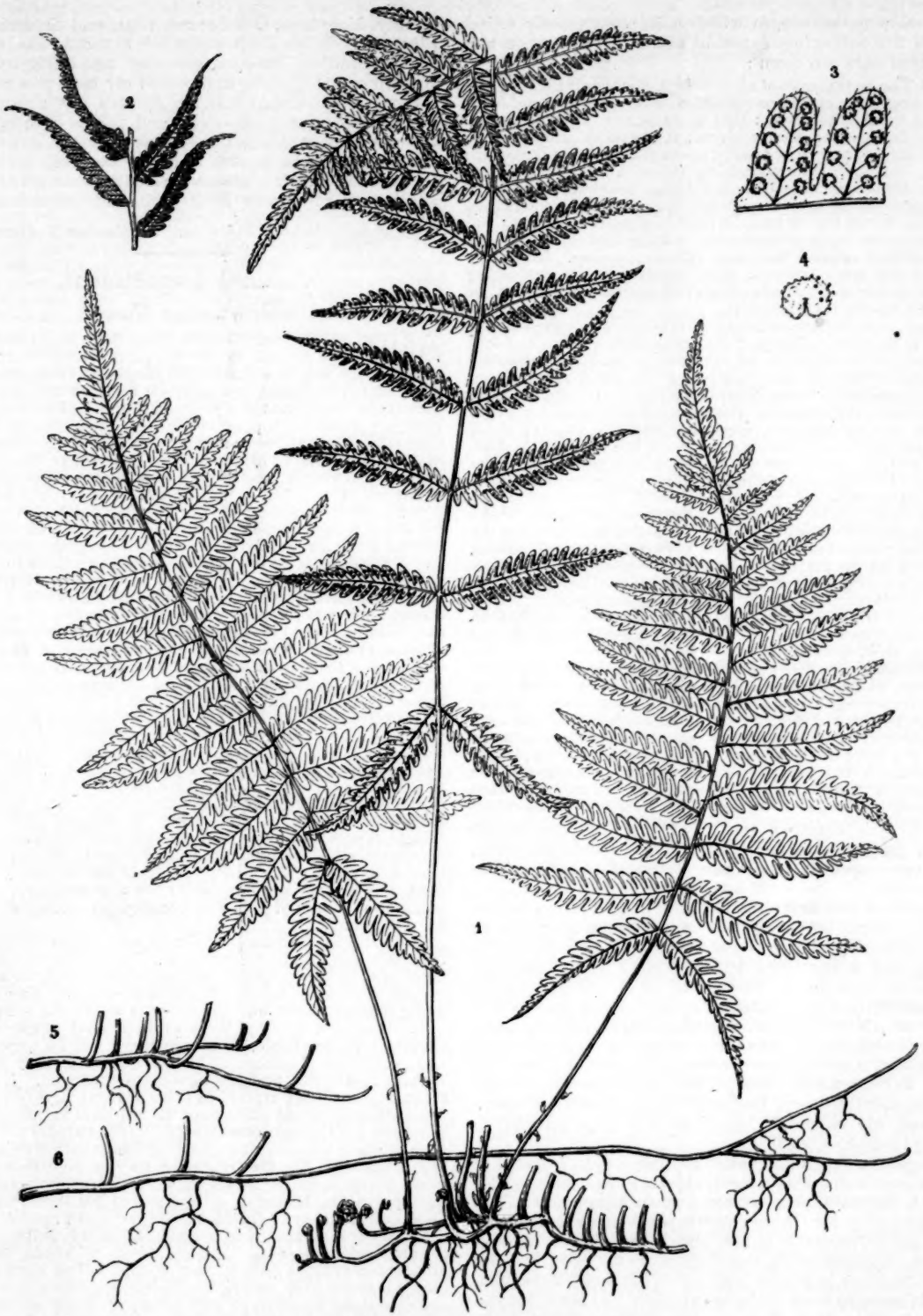

Fig. 69.—Aspidium simulatum, Davenport.—See page 484.

1. Aspidium simulatum, two-thirds natural size. 2. Portion of frond grown in the sun, two-thirds natural size. 3. Pinnules, enlarged. 4. Indusium, enlarged. 5. Root-stock of Aspidium Thelypteris. 6. Root-stock of A. Noveboracense.

belonging to two entirely distinct genera, they cannot readily be distinguished from each other by any merely superficial examination. Small plants of A. simulatum growing near the borders of low woodlands also closely resemble plants of A. Filix-fœmina growing under similar conditions, the outline of the lamina in both Ferns being almost identical.

If we compare Aspidium simulatum with A. Thelypteris

and A. Noveboracense, to which it is most closely allied, we find the following essential points of difference and agreement between them :

First. The root-stocks of all three species are similar in character, being long, cord-like rhizomes, wide-creeping and forking, with these differences: that in Aspidium Thelypteris the rhizoma is black, or nearly black; it branches more freely, and the stipes are farther apart than in either of the other two species. In A. Noveboracense the rhizoma is brown in color, and the stipes are closer together along the lengths than in A. Thelypteris, and form cæspitose crowns at the growing ends. In A. simulatum the rhizoma is light brown in color, with the stipes still more approximate, and forming more frequent and more compact crowns than in A. Noveboracense. The bases of the stipes are persistent in all three species, remaining attached to the rhizoma over from one season to another, or until they wholly wither away.

Second. In Aspidium simulatum the stipes correspond in proportion to those of A. Thelypteris, being usually about one-half the length of the entire frond, whereas in A. Noveboracense the stipes are very short, on account of the lower pinnæ being gradually reduced in length downward along the stipe toward its base where they become mere auricles, a character which prevents any comparison between it and the others; but if there is any material difference between the stipes of A. Thelypteris and A. simulatum it is in the lighter color and greater flexibility of the latter, a character which gives to A. simulatum when growing more of the habit of A. Noveboracense.

Third. A noticeable character in the fronds of living plants of Aspidium simulatum is the peculiar standing forward of the lowermost pinnæ, just as is seen in Phegopteris polypodioides. In pressed specimens these show as if deflexed. The same thing occurs frequently in fertile fronds of A. Thelypteris, but in A. simulatum it is seen in both fertile and sterile fronds. The same is true also of the woodland form of Asplenium Filix-fœmina, to which I have already alluded as being similar in outline to A. simulatum.

In summing up the superficial characters of Aspidium simulatum, we find that it may be readily distinguished from A. Noveboracense by its longer stipe, introrse lower pinnæ, and often by the conduplicate pinnæ of the fertile fronds—the fronds themselves being more or less pubescent, the margins ciliately so; and from A. Thelypteris by its simple veins, larger sori, glandular indusia and less convolute margins of the fertile pinnæ. This species develops later in the spring and continues green longer in the fall than either of the others.

Mr. Faxon's drawing (see p. 485) well illustrates the different characters to which I have here called attention, but for more specific details see *Botanical Gazette* for December, 1894.

The species was first collected at Poplar Bluff, in southeastern Missouri, by George W. Letterman, as long ago as August 15th, 1875, but was confused with Aspidium Thelypteris, and a specimen which I have seen from that collection is now in the herbarium of the Shaw Botanic Garden in St. Louis. About 1880 Mr. Dodge collected it in Seabrook, New Hampshire, and subsequently in Essex County, Massachusetts, in several places up to 1892, when he submitted it to Professor Eaton and myself for determination. In September, 1889, Judge J. R. Churchill collected it in Purgatory Swamp, Dedham, Massachusetts, a specimen from his collection being at that time referred to A. Thelypteris by myself.

In August, 1893, and again in June, 1894, I found it abundant on Indian Point, Georgetown, Maine, and in 1895 Merritt L. Fernald also collected it in Georgetown. In September, 1893, Mr. Dodge and myself made collections of it on the Salisbury marshes, and in Small Pox Woods, Salisbury, Massachusetts, and September 3d, 1894, I found it quite abundant in a deep swamp in Quincy, Massachusetts. It has also been collected at West Roxbury, Massachusetts, by Mrs. M. L. Stevens, Miss Stiles and Mrs. P. D. Richards; in Needham, Massachusetts, by Mr. T. Otis Fuller; in Walpole, Massachusetts, by Mr. H. A. Purdie and Judge Churchill, and it apparently was mixed with Aspidium Thelypteris in a collection made in Stoneham, Massachusetts, by E. H. Hitchings, the specimens being now in the Hitchings collection bequeathed to the Appalachian Club. Mr. C. E. Waters, of Johns Hopkins University, found it abundant at Sawmill Pond, Ann Arundel County, Maryland, October 1st, 1894, and September 24th, 1894, Mr. B. F. Bush collected it for A. Thelypteris at Sapulpa, Indian Territory, one specimen being now in the herbarium at St. Louis, and one in my own possession.

It will thus be seen that the species has already established for itself a wide range, and that it is apparently a very common American Fern, but whether strictly so or not remains to be seen. It might be well, however, for European botanists to search for it in the haunts of Aspidium Thelypteris or among their herbarium specimens of the latter.

Medford, Mass. *George E. Davenport.*

Cultural Department.

Greenhouse Notes.

AFTER the Chrysanthemum feast there is apt to be something of a famine in the way of flowers for cutting purposes, and it requires much forethought to avoid this. It has been for several years our practice to have the first crop of Carnations come in at this particular time, and with this end in view the plants are topped in the field later than is generally advised. The last flower-stems are taken off the second week in August, so that at lifting-time in September there is not a flower-stem visible, and the full crop comes on soon after the plants are established in the house. While it is a large crop, it is not more than the plants can perfect easily. When plants are lifted with flower-buds in quantity, the check incident to transplanting frequently makes the task too great for the plants, and if the flowers do develop it leaves the plants in an unfit condition to produce another crop until late in winter. If the first flowers are now picked there will be no scarcity of them through the rest of the winter. For early use all the largest and most advanced plants from specially early propagation are allowed to develop their buds, and are placed in deep frames in July, and these give an abundance of good Carnations for early use, and may be now placed indoors to take place on some of the Chrysanthemum benches.

Poinsettias are useful from this time on until after the new year. If a number are grown it is possible to have a good display at Thanksgiving-time by placing the earliest in a warm house soon after the plants are brought indoors. We have not failed to have them at this time for several seasons. Few plants give such rich coloring now, when bright flowers and foliage are scarce, as well-grown Poinsettias. To keep the foliage in good condition, a temperature of not less than sixty degrees must be maintained, with a liberal amount of stimulant in the water. When cut, the ends of the stems must be immediately placed in boiling water for a second or two. This will stop the loss of sap, and consequent wilting when used for decorating.

Roman Hyacinths are useful now, and may be had with little trouble if good bulbs are obtained. There has been a marked deterioration in the quality the last year or two, for some unexplained reason, but if the bulbs are smaller they admit of being planted closer, and the effect is about the same in the end. It is best to bring them on in a cool house until the flower-buds are visible, otherwise there will be green leaves and very few blossoms. Lachenalias blend prettily with Roman Hyacinths, and are also easily managed. L. pendula is the best for this purpose, as it is the most vigorous in habit, the earliest to bloom and one of the brightest in colors, though there are a set of new ones that bid fair to surpass this old kind both in vigor and coloring. Lachenalias must not be neglected after blooming, for the treatment they receive then goes to make the bulb for the following year, and a light position on a shelf in a cool house is easily secured for them. They are Cape bulbs, and need the same treatment as Freesias.

From various experiments it seems that this is the best time to sow Cyclamen seed. A good strain of seeds should be bought and sown in pans of very porous soil as soon as possible. It is some time before the growth is visible above ground, and care must be taken to add plenty of some porous material to prevent the soil from becoming sour and inert. We break up a soft brick fine and use the small siftings. It is the best substitute for charcoal. Water must be given sparingly for a week or two or many of the seeds decay before germinating. Once germinated and the returning increase of sunlight of the new year is upon them, it will be found that there will be no check as when sown in September, and the plants will be much larger than if sown at the beginning of the year. Good strong seedling Cyclamens are in most instances preferable to old bulbs kept over, though it must be admitted that if

these can be kept over and grown they make the best plants. This is not an easy task, however, and seems to be understood by few. In any case, it is well to sow a few seeds each year to anticipate losses.

Where hybrid Roses are grown it is best to bring in a few after the Chrysanthemums are all gone. This is also a good time to buy new plants, when necessary. They should be planted in deep boxes rather than in pots. These new plants must not be forced to come in as an early crop, but kept for later use. It is better if they are allowed to start when they please, and the results for the future will pay for the waiting. When pruning Roses at this time it is well to save the growth which is cut off. If the pieces are cut in lengths of about twelve inches, cut clean at a joint at the base and tied in small bunches with names before they are heeled in soil in a cold frame, it will be found in April that there is a callus at the base of each cutting, only waiting to be planted to strike root and make fine young stock on their own roots at the end of the growing season. When planting the cuttings out it is necessary to bury them deep in the soil so as to leave but one or two joints visible above ground. This prevents too rapid evaporation of the stored-up sap and will greatly facilitate the formation of roots. I regret that we did not save all the prunings last fall when looking at the young Roses raised in this way.

Winter is closing in rapidly now, and the cold frames where the stock plants of Chrysanthemums and other half-hardy plants are stored must be, in this latitude at least, well lined with dry leaves, kept in place by rough boards. Many of these frames will be in demand for use as hotbeds later on, and the protection is then indispensable. All plants that are susceptible to injury from frost should be placed in a heated structure now. With the best care frames are apt to get a little frost at times when the mats are damp or the cold very severe, and many useful things not easily replaced are lost in this way.

South Lancaster, Mass. *E. O. Orpet.*

Notes on Roses.

THE stiff-stem fashion has nearly banished the Maréchal Niel Rose from cultivation as a greenhouse climber at the north. Some wonderful specimens of this Rose used to be grown at the Waban Rose conservatories at Natick, Massachusetts, when Mr. E. M. Woods first started Rose-growing. Since under the benching system, with houses of improved construction, more and better Roses can be grown with an almost continuous season of bloom, almost all the older intermittent-flowering varieties have gone out of cultivation. In private gardens, where convenient cross sections afford suitable space, no more useful climber can be planted than this old Rose. Hundreds of fine blooms are cut every year from a plant so situated. The Maréchal Niel is liable to canker, especially when on its own roots, but, so far, our plant, which is now nine years old, has been free from disease. Of the original plant nothing is left but the root-stock, strong shoots from the base having taken its place long ago. In starting a new plant the hardened growth of the original plant should be dispensed with as soon as possible; in fact, close pruning, without regard to an immediate crop of flowers, should be continued a year or two, if necessary, or until a foundation of good, vigorous wood is made. We prune twice a year. Our object originally was by autumn pruning to get a crop of flowers during late winter and on toward Easter-time; by spring pruning in April, to clean out old flowering shoots, reduce the bush to the main stems, and get a fresh growth of strong canes, which would be cut to the amount necessary in autumn again, for another spring crop. But for the last few seasons our plant has bloomed on all summer, not to any great extent, but never at any time have we been without flowers, and some of the finest we ever cut; the stems, in some cases a yard in length, have grown during summer-time.

We often see hybrid Roses offered in the salesrooms, and of late years the department stores have been selling plants cheaply. They are imported stock, and often good plants. There is no guarantee given with the names, and these are frequently incorrect. Whether true to name or not, they are for the most part standard varieties, probably the leavings of the nursery. Since the department stores have been selling this stock a great number of plants have been bought by people having small places on the outskirts of the city, who probably never would buy a plant of a regular dealer. The condition of many of these plants when bought gives little chance of their growing, and, besides this, in most cases so little is known by the buyers of the proper way to treat them after being bought, that not one in a dozen has a chance for life. To begin with, the big stores make little effort to keep the plants in good condition. I have seen them brought from the city as dry as dust and shriveled beyond hope of recovery. When the packages are opened, plants at all dry should be dipped in water and laid in moist sand (this would be clean to handle), and kept in a cool place until ready for the sale. They would have time to plump up. All plants offered should be kept in moist sand until sold. If nothing better could be done in the way of packing the plants for delivery to customers, a little cheap absorbent paper might be put about the roots as a first covering, and finished on this in the way of ordinary parcels. These simple precautions would place the plants in the buyers' hands with some chance of living.

Roses ought not to be planted until spring. I would rather buy my plants now and care for them myself than trust to a later shipment and find the plants started in transit, which means destruction. I should not do any pruning until time to set them out. Until then they might be kept in boxes, with a little soil about the roots, in a cool cellar, but it is hardly possible that any but a barn cellar would be cool enough. I would rather set the boxes of plants outdoors, where they would not be swamped with thawing snow, and cover the whole lightly with meadow hay, pine needles or stable litter. When spring comes I would prune them and plant firmly, covering the union of stock and scion, or up to the point where the branches diverge.

Wellesley, Mass. *T. D. Hatfield.*

Desirable Bulbous Plants.

THE well-known Cyclamen Persicum is one of the best of its class for the greenhouse, and for window culture if properly watered and the room is not too warm. That Cyclamens can be raised from seed and grown on to perfect flowering specimens in a living-room is doubtful; but when grown to flowering size in the greenhouse and brought into the house in bud they will continue to flower for two to three months.

A few nice specimens of Eucharis grandiflora and E. candida will prove useful in the conservatory, and with little management may be had in flower at almost any season. By successive periods of growth and rest it is not unusual to get two or three crops of flowers from E. grandiflora within twelve months, though this is sometimes a strain upon the bulbs. To secure large specimens a number of bulbs should be planted together in a ten-inch pot in a rather coarse compost of fibrous loam, with some peat and sharp sand or crushed charcoal to make the mixture more open, some dried cow-dung and a small portion of bone-dust for fertilizer. After potting they should be kept in a night temperature of about sixty-five degrees and watered rather sparingly until the plants become well rooted. When well established they should be freely watered and syringed. A short season of comparative rest is necessary to secure a good crop of bloom. This can be provided by keeping the Eucharis somewhat cooler, and partially withholding water for a time. Care must be taken not to let the plants lose their leaves. Frequent repottings are not needed, but a top-dressing of new soil should occasionally be given, and also occasional waterings with liquid-manure or soot-water.

The hybrid Amaryllis (or Hippeastrums, as this section is now termed by botanists) include some of the most showy bulbs for the conservatory, and can be readily brought into bloom in succession throughout the winter and spring. They should not be disturbed after the growth is completed for the year, and repotting should be done immediately after the flowers are over, during active leaf and root growth. Good loam, including a little bone-dust, forms a suitable soil, and plenty of water, with a growing atmosphere at about seventy degrees, provides the conditions for rapid progress with these plants. After the leaf-growth is completed, rest is necessary in a low temperature, with only water enough to keep the bulbs from shriveling.

Griffinia hyacinthina, another pretty Amaryllid, while long in cultivation, is not by any means common. This plant thrives under similar treatment to that needed by Eucharis. Like the latter, it is evergreen, and requires only moderate drying during the resting season. It has broad, dark green leaves, somewhat resembling those of Eucharis grandiflora, but more flat and with peculiarly netted veins. The umbel of flowers is thrown up on a stout scape. The individual flowers are about three inches in diameter and pale violet in color.

Some of the Crinums and Pancratiums can also be used to advantage in the conservatory, and have the additional merit of not needing high temperatures to bring them into bloom. Crinum amabile, C. Kirkii and C. Moorei are among the best,

but, having very large bulbs and luxuriant foliage, they occupy considerable space. The Pancratiums, as a rule, are not so large, but produce strong spikes of fragrant flowers, most of the species being white. Neither Crinums nor Pancratiums are specially fastidious in regard to soil, though responsive to good cultivation, and they absorb large quantities of water while in active growth.

Holmesburg, Pa. *W. H. Taplin.*

Yucca Gloriosa.—For the first time, so far as I can ascertain, this plant has flowered perfectly here. It blooms late in the season, and until this year every attempt it has made to flower has been frustrated by freezing weather. This year a slight covering at night has sufficed to protect it against the lowest temperature yet experienced, and for three weeks or more its large panicle of flowers has been a novel and attractive spectacle. The warm weather has permitted every flower to expand, and although it is now (November 20th) past its best, it is still an object of much interest. It has a second branch almost ready to flower, but it is too much to hope for more flowers with winter at hand. I know only one or two more examples of this arborescent Yucca in Philadelphia. They are quite hardy here, and, no doubt, if they were planted in a warm, sheltered place the flowers would often expand in spite of their late appearance.

Germantown, Pa. *Joseph Meehan.*

Iris macrosiphon.—The experience of Max Leichtlin in growing this pretty Iris successfully, as given by Mr. Gerard in a recent issue of Garden and Forest, is valuable to growers. Herr Leichtlin states that at Baden-Baden they start into growth in May. This is interesting as showing how quickly plants adapt themselves to changed conditions. In its native home, here in the northern Coast Range, I. macrosiphon lies dormant during the dry, rainless season, from May to October. The first light rains start a root-growth, the old roots pushing out rootlets and new spongy roots forming at the base of the growing end of the wiry rhizome. The leaves soon start. Its growth is here a winter growth, and with its flowering in May begins the ripening, to be followed by the long summer rest. At Baden-Baden it would seem to take a winter rest and make growth in summer. Otherwise, my experience corresponds with Herr Leichtlin's, in that the best time to move the plants is just as they begin to start. Examination of a bed of several hundred collected plants moved October 15th shows that they are now (November 16th) making a vigorous root-growth.

Ukiah, Calif. *Carl Purdy.*

Correspondence.

Notes on the Vermont Apple Crop.

To the Editor of Garden and Forest:

Sir,—The American apple crop, taken as a whole, is very large this year; but northern New England seems to have a proportionally larger excess than any other section in Canada or the United States. The crop here is nothing less than phenomenal. The actual commercial crop is probably twice as large in the apple growing regions of Vermont as it has ever been known before. This is largely due to the favorableness of the season; but partly, also, to the considerable number of young trees coming into bearing. In fact, the present remarkable supply of apples calls attention to the fact that, in the apple-growing sections of the state, orchard planting has been steadily going on for some years. In contrast to this, in those parts of the state where apples are not commercially grown a young apple-tree is a curiosity.

The crop in Vermont is not only large, but is much better in quality than usual. This, of course, must be credited largely to a favorable season, for, with the very large crop carried by all trees, it would not have been surprising to gather small and poorly flavored apples. The summer was comparatively dry, without being disastrously so, and the damage by the scab-fungus was therefore reduced to a minimum. Thorough spraying, now generally adopted in this region, contributed to the same result. This year's spraying, fortified by good spraying in preceding years, has also practically eliminated the factor of loss by the codling-moth. There is thus an unusually large proportion of first-class fruit.

Prices have been low here as elsewhere. This misfortune has been aggravated in many neighborhoods by proportionally large pickings of early fall fruit, mostly Fameuse (Snow). These early apples have been pressed upon all buyers to the temporary disadvantage of the later varieties. A few growers are prepared to store their winter apples. The winter varieties most grown for market are Northern Spy, Rhode Island Greening, Baldwin, King and Golden Russet, with a considerable number of young Ben Davis coming into bearing. The Arctic is a new commercial variety of great promise, now just beginning to bear.

Although prices are low, the crop will be sold at a profit, and commercial apple-growing on the shores of Lake Champlain will receive substantial impetus and encouragement.

Vermont Experiment Station. *F. A. Waugh.*

Dendrolene as an Insecticide.

To the Editor of Garden and Forest:

Sir,—Among other things which have been sent to us for trial the past season was a package of Dendrolene, sent by the Bowker Fertilizer Company, of Boston, Massachusetts. They asked that it be given a thorough trial on various kinds of fruit and shade trees, for the purpose of determining its effectiveness in keeping out borers and other noxious insects, and also as a protection against mice and rabbits.

The material was applied to a number of young, healthy stock trees of Champion, Crosby and other varieties of Peach, and also to a number of the same varieties bearing their first crop of fruit. A number of young Apple-trees, just transplanted, were also coated. The material was applied in May, according to directions, by coating the trunks of some trees from the ground to the lower branches, and others only about halfway up. On examination, about the middle of August, it was found that several of the young Peach-trees were beginning to drop their leaves and to show signs of general debility. A little later the older trees began to show signs of trouble, and on making a careful examination of the trees about the first of September it was found that the material had been absorbed by the bark to such an extent as to shut off the circulation of sap completely, and that the inner bark, or cambium, had turned black and apparently dead. The same was true to a somewhat less extent in case of the young Apple-trees, so that a month later every Peach-tree and most of the Apple-trees to which the material was applied were dead.

As it is not always safe to draw conclusions from a single experiment, it was not deemed advisable to publish these results until the material had been given a further trial, inasmuch as it had been carefully tested in New Jersey under the direction of Professor J. B. Smith, one of the most careful and competent entomologists in this country, and found to work very successfully (see New Jersey Experiment Station Bulletin 111, also Garden and Forest, vol. viii., p. 470). But in looking over the September number of the *Wisconsin Horticulturist* I find an article by Professor E. S. Goff on the same subject, and giving similar results, except that his losses were much greater than ours, as he "had it applied to the trunks of nearly one hundred trees." And he adds, "Many of the trees to which it was applied are already dead, and the indications are that few, if any, of them will ever leave out again." It seems a little remarkable that the results obtained in Wisconsin and Indiana should be so different from those obtained in New Jersey, but these are the facts, which I am at present unable to explain. It would seem, however, that we are safe in saying this much, that the material in its present form is not safe to use on young Peach-trees in this section, and I would not recommend its use on any tree until further trial.

Experiment Station, La Fayette, Ind. *J. Troop.*

Recent Publications.

American Highways: A Popular Account of their Conditions and the Means by which they may be Bettered. By N. S. Shaler. New York: Century Company.

In the preface of this excellent book Professor Shaler modestly recounts some of the personal experiences which have helped to educate him for its preparation. He states that during the civil war he was called upon to study the significance of wheelways in the critical work of campaigns; that ever since the war he has been interested in road-making in connection with geological work; that he has been actively engaged for four years as one of the Massachusetts Highway Commission in developing a plan for the betterment of the roads of that state; that he has helped to lay out and construct a hundred roads, having made a special study of the relations of road-building ma-

terials to the special needs of each; that he has helped to devise a system for the instruction of road-making engineers in the Scientific School of Harvard University; and that he has prepared reports to the United States Geological Survey on road-building materials. To these practical qualifications it may be well to add that his mind is trained to habits of close observation; that he has the sound judgment which insures safe generalization; that he takes a comprehensive and common-sense view of the relations of his subject to the social and economic needs and habits of our people, and that he has the faculty of orderly and lucid statement. Of course, his book is graphic and instructive, and we may add that it is especially timely. The desire for an improvement in our highways has grown within a few years until it has assumed the dignity of a popular movement, and it is important that the people should not be carried away by mere enthusiasm to waste their money on experiments. Therefore Professor Shaler's account of what has been done and what can be done in the way of road construction and maintenance cannot but be helpful to every public-spirited citizen who reads it, and especially to every one who has the remotest official connection with our highways. It is not meant to be a treatise for engineers, but it will be found a safe and sufficient guide as to plans, material, repairs and administration for every one except the professional road-builders, who need to be schooled and skilled in the refinements of the art.

It has come to be admitted by the discerning that good facilities for transportation are necessary to the best intellectual development of a people as well as to their physical comfort and financial prosperity. Our people, therefore, need instruction in the history of roads and their relation to human progress. They ought to learn, first of all, that the building of a good road is a task which demands serious thought, and that the design and construction of a highway should never be undertaken except by men who have special and adequate training for the purpose. Again, the people ought to have clear ideas of what it costs to build good roads and what it costs to keep them; and if, in order to secure the advantages of good highways, they feel that they can afford to expend a certain amount they ought to have some general ideas of the methods which must be adopted if this amount is expended to the best advantage. Since the conditions which determine what is the best road system vary greatly in different parts of the country, it will not answer for any community to copy blindly the methods of another, for such a simple matter as the character of the subsoil or the kind of stone available for the surface, or some other single feature of the situation, may differ so much in the two cases as to change the whole problem fundamentally. The questions which naturally present themselves to one who takes this view of the case, and many more which grow out of special conditions, are discussed by Professor Shaler in a very attractive way. These questions are so comprehensive and touch so many interests that even the unfortunate person who is known as the general reader will find much pleasure and profit in such chapters as those which treat of the relations between roads on the one hand and climate, soil, topography, forests, etc., on the other.

In almost every chapter, and especially in those which treat of the Distribution of Road Material and Methods of Administration, there is something we should like to quote, but we have only space to call attention to a few points brought out in the chapter on the Relation of Public Highways to the Ornamentation of a Country, which is more within the special field of this journal. Roads can do very much to modify a landscape in one way or another, and therefore it is fitting that a civilized community should pay some heed to the æsthetic quality of our highways. Professor Shaler holds that roads, as a rule, fit harmoniously with the natural views of the country they traverse in proportion as they are laid out and built to best serve the needs of that country. That is, the more graciously they accommodate themselves to the surface the more likely they are to be a pleasing addition to the prospect. The first æsthetic law in the construction of a road is that it should not be obtrusive, and if it is held as nearly as possible to natural grades it will not be so offensively manifest as it will be if carried boldly against obstructions so as to require much excavation and embankment. A second point is that the traveled way should not be unnecessarily wide. A road with a wheelway not more than fifteen feet wide is nothing more than a thread in the landscape from any point of view, while a space of fifty or sixty feet in width, plowed by irregular ruts, will have a much greater tendency to mar the beauty of any scene. Where the shoulders of the road are kept in grass, the slopes sown with grass or planted with some vegetation, beauty as well as utility is served. Roadside trees, if planted so thickly as to make a deep shade, have a tendency to keep a dirt track too wet. If they are strong-growing trees they are apt to extend their roots under the gutters and roadways so as to disrupt the structure, and in the winter season their effect on drifting snow may be bad. It is also true that regular lines of trees give an artificial look which is not always pleasing, although when the trees are individually noble their own beauty may offset this defect. Long lines of evenly grown trees of certain species may also produce some pleasing architectural effect; the arching habit of the American Elm and the columnar growth of the Lombardy Poplar adapt these trees especially for such use. But we agree with Professor Shaler that the highest adornment of a road is accomplished by the systematic planting of trees in groups on either side of a traveled way, the species being varied and the outline of the plantations toward the road broken so as to make pleasing vistas. This work of planting should be entrusted to some one who is familiar with the expression of trees in their adult growth, and when highway borders are properly planted this will prove the most satisfactory of all rural adornments which can be secured for a given amount of outlay. The suggestion of Roadside Parks is so novel that we quote the passage:

> Now that the advantage of public reservations is much considered by our people it appears desirable to organize parks or commons with reference to the main highways. On almost any road having a length of three miles or more it is possible, in New England at least, to select one or more attractive bits of ground which may be devoted to this use. These reservations need not be of great area in order to be effective. It often occurs that a strip of land next a river or lake which is skirted by the road or a bit of picturesque rocky ground can be obtained by gift or at a low money cost because the place has no agricultural value. Although it is desirable that all these dedications to public use be cared for, it is often better that they should be left in the simple wilderness state rather than be made the seats of elaborate ornamentation. A study of the Massachusetts roads indicates that a thousand reservations of the nature here indicated could be obtained by purchase at a fair money value, at a total cost of less than $100,000, the average area being not over five acres. The probable total length of the roads in Massachusetts which are to be taken over by the commonwealth is 2,000 miles. Thus the system proposed, if completely applied, would give bits of park at an average of about two miles. The Trustees of Public Reservations is a body empowered to hold pieces of land in Massachusetts dedicated to public use, and this indicates an excellent means whereby land may be held safe from the temptations which would beset municipalities to part with such holdings at the solicitation of persons of local influence. The transfer of roadside park places to similar commissions in other states is to be commended as a measure of safety against such encroachments as have served to destroy many of the original commons in Massachusetts and other states, and which in Great Britain have lost to the people more than three-fourths of the land which were public property three centuries ago.

In the same chapter there is a strong plea for stone arch bridges, not only for enduring quality but for their beauty. Steel bridges, according to the present methods of construction, are necessarily unsightly, and no attempt at decoration can make them otherwise. The book is helpfully illustrated, and it has instructive appendices about road legislation, experiments on material for road-building, contract

prices for roads actually constructed, and a list of important works of a popular character on highway construction.

Notes.

A temperature in the seventies is unusual the last week in November, and therefore it is not surprising that the trees started into leaf, that the lawns hereabout were starred with Dandelions and other spring flowers, and that many early-flowering shrubs showed abundant bloom. This was especially true of the Bush Honeysuckles, Lonicera fragrantissima and L. Standishii, whose white flowers appear before the leaves in spring. Many of these bushes in Central Park displayed a fairly good crop of fragrant flowers.

As a rule, the production of Orchids from seed is a long process, but with some species it would seem that the grower may not be obliged to wait an unreasonable time for new plants. A correspondent of *The Orchid Review* writes that on the 28th of March, during the current year, he applied the pollen of Phaius grandifolius to the stigma of Bletia catenulata, from which a pod ripened and burst on the 10th of May. The seeds were planted the same day, and on the 4th of June a batch of seedlings were up, and are now nice little plants—that is, the whole period from the application of the pollen to the germination of the seed was only a little more than nine weeks.

A correspondent, Mr. F. K. Steele, writes from the Ozark Hills in praise of the beauty of Talinum teretifolium, a low, leafy-stemmed, succulent plant belonging to the Purslane family. It is, indeed, a pretty little plant, bearing on stems about five inches long a cyme of pink and rose-purple flowers which keep succeeding one another from June until August. It is said to be a perennial, but Mr. Horsford, in an account of it in this paper a few years ago, stated that it flowered the first year from seed, but did not survive the winter. This, however, may have been owing to the open winter. It does well in shade, and in the Ozark Hills it grows where the soil is only a few inches thick above the rock.

Dr. Halsted calls attention to a serious trouble with Chrysanthemums in the shape of a blight which spots the flowers as soon as they are fully developed, and sometimes before. The trouble starts with small circular dark specks on the corolla of the florets, which are darker than flowers of the lighter shades and lighter than the maroon-colored ones. These spots have a watery appearance at first, which is shortly followed by a dry condition and a white mildewy growth which finally turns olive and brown and entirely destroys the flowers. Sometimes there are half a dozen starting points of the blight, and then the destruction is very rapid. Skillful growers say that the life of the plant is shortened at least one-third of its natural length. The fungus is a member of the genus Alternaria. The spores are produced abundantly upon the surface of the blighted mass, and as they germinate quickly a house once attacked is quickly overrun.

From a treatise on American Vines in France, lately prepared by Messrs. P. Viala and L. Ravaz, it appears that our Vitis rotundifolia possesses the greatest immunity from the attacks of phylloxera, and in a list of Vines where the Number 20 represents absolute freedom from attack this species is rated at 19. After this comes V. riparia, which is marked 18, and in the same grade we find various hybrids between V. rupestris, V. cordifolia and V. riparia. The first plant in the grade, numbered 17, is V. Berlandieri, which is followed by some hybrids. It seems from the list that many of the hybrids are better adapted to resist the attacks of the phylloxera than either of the parent species. Of course, the American Vines are not entirely exempt from phylloxera, but they do not yield to the attacks as the European kinds do, so that the introduction of our plants to be used as stocks upon which the European varieties are grafted has saved thousands of acres of vineyards in France from destruction. This report gives many interesting facts in regard to the methods of grafting and of cultivating the vines and the adaptation of the different American species to various soils and exposures.

Mr. W. G. Johnson, the Entomologist of the Maryland Experiment Station, declares in a recent bulletin that it is somewhat difficult for an average observer to detect the San José scale unless it is very abundant. When a twig is badly infested the entire surface appears under a hand lens as if it were a continuous mass of minute shells from the size of a pin's head downwards. If one of the larger scales is raised with the point of a knife, a small, waxy-looking mass may be seen, and this is the insect. During the summer young orange-colored lice can be seen crawling over the twigs, but they are mere specks. When the branch of a tree loses its foliage before the rest of the tree, or when a twig appears as if it had been covered with ashes, it should be carefully examined, and when the bark of infested twigs is scraped with a knife the numerous insects cause an oily yellowish liquid to appear on the surface. In Pear-trees particular attention should be given to the extremities of the twigs, especially if the leaves turn brown. In infested fruit of the Pear an encircling band of reddish discoloration is seen around each insect. A little lady-bird beetle about the size of a pin's head is often seen running about on infested trees, and wherever it appears on trunk or branches a careful search should be made for the scales on which it feeds.

W. H. Lincoln and Mayflower are still among the best chrysanthemums seen in the flower-shops this week, with some especially good blooms of the golden-yellow Mrs. Grant, brought from Philadelphia. Other chrysanthemums yet in the trade are the yellow Challenge, said to be a good keeper, the pink Erminelda, George W. Childs, Sunrise, bright terra-cotta tinged with gold, and Niveus. Among the highest-class carnations of many varieties now in season are the bold white flowers of Storm King, Maud Dean, white ground, shaded and splashed with rosy pink, and the handsome Lillie Dean, very double, delicately striped and edged with bright red, and delightfully fragrant. After these in popular favor and price come the showy Portia and the dark maroon Anna Webb, Daybreak and the rosy Tidal Wave. Somewhat more plentiful and cheaper are William Scott and Lizzie McGowan, while Alaska and Mrs. Fisher are other varieties noted. The new President Carnot roses command $6.00 a dozen; Bride and Bridesmaid, $4.00, and American Beauty, $12.00. The window of one of the Broadway establishments, where a few odd and rare flowers are almost always to be seen, yesterday contained some plants of Sarracenia purpurea (wild Pitcher-plants), giant spikes of Mignonette, flowers of blue Centaurea, lily-of-the-valley, Violets, white and pink Bouvardia, Bermuda lilies, jessamine, stevia, paper-white narcissus, flowering Roman narcissus, well-berried sprays of holly, and Cyclamen-plants in flower. Anthuriums and Cypripediums were striking features in other window decorations, as were luxuriantly flowered Heaths, Otaheite Orange and low, compact Azaleas. In one display thickly berried, leafless branches of Ilex verticillata gave brightness to a drapery of Asparagus plumosus.

Anthony Waterer died at Knap Hill Nurseries, at Woking, in Surrey, on the 16th of November, after a short and painless illness, in the seventy-fifth year of his age. He is most widely known as the originator of many of the best hybrid Rhododendrons in cultivation, and he and predecessors in his family did more than any other firm to popularize the cultivation of Rhododendrons, Azaleas and other hardy shrubs of this class. The Knap Hill Nurseries, which had long been notable, grew in size, importance and reputation under Mr. Anthony Waterer's successful management, and at the time of his death had become probably the greatest nursery of hardy plants in the world, although a larger number of species of plants were cultivated in others. For Rhododendrons, however, hardy Azaleas, to which of late years Mr. Waterer gave special attention, and the choicest conifers it had no rival. Anthony Waterer had many correspondents in the United States. His connections here date from the time of Downing, who imported plants from Knap Hill for the Capitol grounds at Washington. After Downing's death the unpaid bill for these plants was found among his papers by his executor, Henry Winthrop Sargent, of Fishkill. Mr. Sargent was a classmate of Charles Sumner, and through his assistance he succeeded in obtaining from Congress an appropriation to pay this bill. From this sprung the friendship which existed for years between Mr. Waterer and Mr. Sargent, who for many years was one of the principal horticulturists of the United States. From this friendship others sprung, until gradually all the principal cultivators of hardy trees and shrubs in the United States became friends and clients of Anthony Waterer, who of late years has devoted special attention to breeding Rhododendrons capable of supporting the climate of this country. In 1876, when the Knap Hill Nursery made a special exhibit of Rhododendrons in Philadelphia, Mr. Waterer visited the United States. A man of the highest integrity, rough in manner, but kind of heart, Mr. Waterer was a type of the English cultivator of the old school not often seen now. We all owe him a debt of gratitude for the plants he has produced for us, and those who have had the advantage of his friendship will never forget his strong and interesting personality.